R4 PFAS INFORMATION – Water Related Issues

February 8, 2019

CHEMOURS BACKGROUND AND UPDATE

- In 2016, EPA ORD and NC State published a study entitled *Legacy and Emerging Perfluoroalkyl Substances Are Important Drinking Water Contaminants in the Cape Fear River Watershed.* The study showed GenX levels at 4,560 ppt in a surface water sample, 100 miles downstream, in Wilmington, NC, which is served by the Cape Fear Public Utility Authority (CFPUA). Other impacted drinking water systems in Pender, New Hanover (which encompasses Wilmington) and Brunswick Counties reported detectable GenX levels.

- Region 4 learned about the study and subsequently learned that Chemours has been producing and discharging GenX, as a byproduct, into the Cape Fear River since 1980. A TSCA Section 5(e) Consent Order authorized Chemours to manufacture the dimer acid and ammonium salt forms of GenX under specific conditions, but the TSCA order did not authorize the discharge of GenX as a byproduct.

- To assist the State, Region 4 arranged through ORD and SESD independent laboratory analysis for GenX and 22 other PFAS compounds collected by NC DEQ from the Chemours Outfall and several public water systems along the Cape Fear River. The water systems sample independently and the levels have been consistently low. (See chart below for results).

- Region 4 worked with the State to discuss the appropriate GenX/PFAS discharge limits, monitoring and reporting requirements to include in the reissued NPDES permit. Currently, the permit has been administratively continued.

- In a Partial NC DEQ Consent Order (dated September 8, 2017), the court ordered that Chemours prevent the discharge of process water containing Gen X into waters of the State. On November 16, 2017 NC sent a Notice of Partial Suspension and a 60-day notice of intent to partially revoke the NPDES permit. As a result, Chemours pumps process water into storage containers and stores the containers onsite before transporting and disposing of them through one of the following processes: incineration in Texas; deep well injection in Texas and incineration in Canada.

Regional collaboration:

- Region 4 collaborated with Region 3 to discuss NPDES permit concerns.

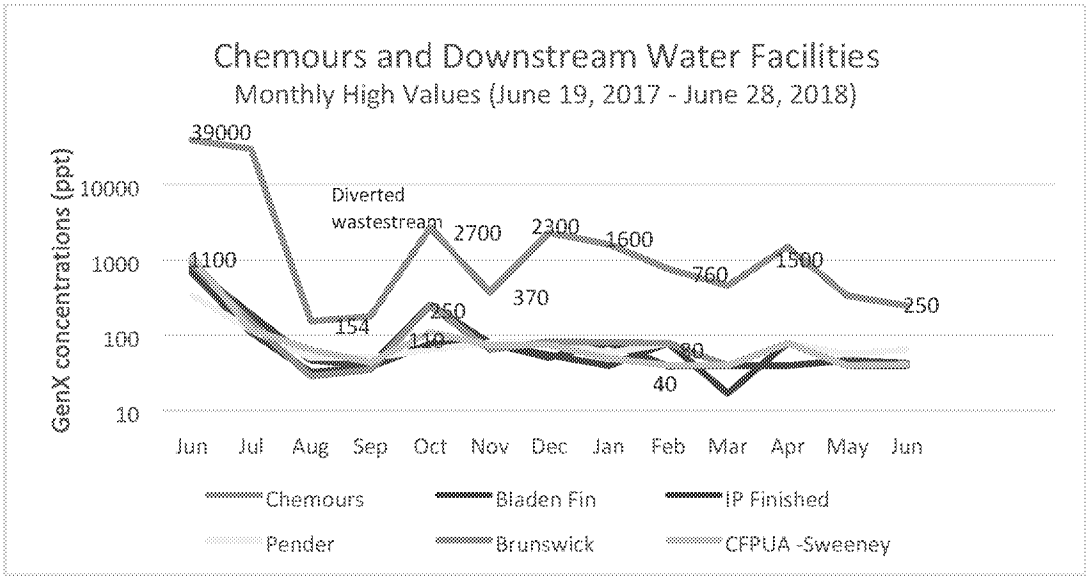
- On July 30, 2018, the NPDES permit for the Chemours facility in Washington, WVA was issued and will remain effective through July 29, 2023. The effective date of the reissued permit was September 1, 2018. The permit contains interim and final effluent

limits for PFOA and Gen X (HFPO Dimer Acid) for several external outfalls consisting of process waters, storm waters and cooling waters. Limits for Gen X were based on a value of 140 ug/L (for the protection of human health and the environment) and results of CORMIX modeling. There are monitoring only requirements for PFOA and Gen X for several external outfalls, consisting of storm water and/or cooling water. The permit includes a Schedule of Compliance requiring the permittee to identify sources for PFOA and Gen X, perform treatability tests, and design and construct necessary treatments to comply with the final permit limits by September 1, 2021.

Recent NC Multi-media order out for public comment:

- Requires Chemours to notify and coordinate with downstream public water utilities when an event at the facility has the potential to cause a discharge of GenX compounds into the Cape Fear River above the health goal of 140 parts per trillion.

- Characterizes PFAS in process water, non-process wastewater, and stormwater at facility, and provide NC DEQ with test methods and lab standards for all PFAS.



Additional Information:

- (**NC DEQ**) Additional Budget allocated as follows:
  - $2M to NC DEQ's Division of Water Infrastructure to help local governments hookup to public water systems.
  - $1M in recurring funding for new testing positions, reducing permitting backlogs, air sampling and analysis for PFASs.

- **Recurring funding**
  - $1,010,575 – sampling and analysis for PFAS and permitting back log.

- **Non-recurring funding** (repurposed from prior in situ nutrient management funding)
  - $613,000 – sampling and targeted analysis for PFAS
  - $200,000 – permitting backlogs
  - $232,950 – atmospheric deposition
  - $279,050 – sampling and analysis of groundwater wells, soil and sediment
  - $537K to purchase a triple quadrupole mass spectrometer limited to targeted analysis. The state will still need to work with the Agency for non-targeted analysis.

- **The North Carolina Policy Collaboratory**
  - $5M to award grants to multiple researchers to launch state-wide PFAS monitoring, which will establish a baseline and monitoring protocol for sampling water sources; examine air emissions to determine water impacts; develop PFAS models to predict private well impacts; and assess the impact of PFAS on public health and understand remediation technologies. (https://insideepa.com/daily-feed/north-carolina-launches-state-wide-pfas-monitoring); (https://sph.unc.edu/sph-news/nc-appropriates-5m-for-multi-university-study-of-genxsurratt-to-serve-as-lead-investigator/) [Full value is $5,013,00]

- NC DHHS partnered with CDC to conduct PFAS blood and urine testing for 30 residents near the Fayetteville Works facility. In November 2018, the results were published. GenX was not detected in the blood or urine of any of the participants. Four PFAS compounds (PFHxS, n-PFOA, Sm-PFOS and n-PFOS) were detected in all blood samples. Most PFAS were not detected in blood or were detected at levels similar to the US population.

- Although NC has not issued a fish advisory for GenX, the community is concerned about their food supply. NC DEQ has collected fish tissue from Marshwood Lake, a recreational pond just north of the plant with GenX concentrations as high as 915 ppt (Spring 2018). NC DEQ conducted a follow-up fish tissue study in Fall 2018 to assess bioaccumulation factors; however, that data has not been made available.

- NC DEQ has discussed the potential impact and safety on locally grown produce with the Department of Agriculture. This analysis of this data will be shared once available.

- In November 2017, NC State began a GenX Exposure study. This study included the analysis of GenX levels in tap water, blood and urine samples of 340 citizens in New Hanover County, NC. The study also included 16 other PFAS compounds, similar to the ORD/SESD suite of compounds(https://chhe.research.ncsu.edu/the-genx-exposure-study/). The tap water results showed that most samples had GenX, Nafion byproduct 2, PFMOAA, PFO_2H_XA, PFO_4DA. GenX levels were below the state's health goal of 140ppt. In blood results, GenX was not detected; however, other PFAS compounds (Nafion byproduct 2, PFO5DoDA, PFO_4DA and Hydro-Eve) were detected. Additionally, historical PFAS compounds (such as PFOA and PFOS) were found at

higher levels within Wilmington, NC residents than the US population. Of the study population, some residents gave blood in November 2017 and a second sample in May 2018. Overall, the PFAS levels declined within the six-month window. In November 2018, all study participants received a letter withtheir results. Currently, NC State plans to complete testing for the urine results and release that data in late 2019.

ELSEWHERE IN NORTH CAROLINA

Pittsboro: As part of the NC State/Cape Fear Study, Pittsboro (a smaller water system) was studied and reported to have detectable PFOA and PFOS levels at 447 ppt combined. After this report was issued, the utility conducted one confirmatory sampling event. The results of the event indicated that combined PFOA and PFOS levels were below the HA. In July 2017, the water system installed Powdered Activated Carbon treatment. WPD has not received any confirmatory sampling results. (confirming)

Greensboro: In 2015, UCMR 3, Greensboro had a PFOS value of 90 ppt and recent (August 2018) PFAS levels are approximately 96 ppt. After the issuance of the HA, Greensboro water officials began to utilize the Townsend WTP and curtail flow from the Mitchell WTP. WPD has reached out to Greensboro but does not have updates on their sampling results or the schedule of their treatment system installation. (confirming)

Since the HA, Greensboro conducted confirmatory sampling to identify the single source of PFOS contamination upstream in the watershed. Greensboro water officials initially suspected that the major source of PFAS contamination was limited to the Piedmont Triad Airport (PTI); however, results from recent sampling efforts demonstrate different occurrences of releases from various sources, with concentrations ranging from non-detectable to 1,001 ppt for PFOA and PFOS combined (in a deep well at the airport). Region 4 has not seen the sampling results. As of August 7, 2018, the City initiated weekly sampling to optimize their response, since they have a combined PFOA and PFOS level of 96ppt.
(*https://www.greensboronc.gov/Home/Components/News/News/11797/36?backlist=%2F*)

The Region has remained in direct contact with Greensboro water officials. Greensboro recently completed their Dissolved Air Flotation (DAF) and Granular Activated Carbon (GAC) pilot testing efforts. WPD has reached out to the City for updates on their retrofitting efforts to install treatment at their Townsend plant and plans to install treatment at their Mitchell Water Plant. No updates are available at this time.

Federal Facilities

Based on the DoD report (dated March 2018), Region 4 has approximately 14 federal facilities that have combined PFOA and PFOS contamination ranging from 40ppt – 4,300,000 ppt in six states (NC, FL, GA, MS, TN SC). This data is accurate as of August 31, 2017.

Next steps: For DoD facilities supplying drinking water at levels above the HA, DoD has worked with the facilities to identify both short-term and long-term remedial options, such as identifying the source, taking wells offline and providing alternate drinking water.

Department of Defense – Drinking Water Data accurate as August 31, 2017 *Region 4 does not have this data					
	Service	Installation	State	Lowest PFOA +PFOS (ppt)	Highest PFOA + PFOS (ppt)
1	Navy	NAS Whiting Field	FL	*	259
2	Navy	Jacksonville	FL	3,410	1,397,120
3	Navy	Pensacola	FL	250	126,300
4	Air Force	Cape Canaveral	FL	74	53,000
5	Air Force	Eglin	FL	4,300	280,000
6	Air Force	Patrick AFB	FL	71	4,300,000
7	Air Force	Moody AFB	GA	590	375,000
8	Air Force	Robins AFB	GA	150	1,400
9	Navy	Gulfport	MS	91	480
10	Navy	Meridian	MS	123	23,000
11	Army	Earle Rives AFRC	NC	40	90
12	Marines	Cherry Point	NC	*	*
13	Air Force	Former Myrtle Beach	SC	7,504	2,640,000
14	Navy	Millington	TN	70	1,238

MCAS Cherry Point (Atlantic, NC): As of July 6, 2018, two private wells near MCAS Cherry Point had levels reportedly above the HA (exact values were not provided). In the interim, both property owners have been contacted and were provided an opportunity to receive alternate drinking water until a permanent solution is determined. (*https://www.navfac.navy.mil/products_and_services/ev/products_and_services/env_restoration/installation_map/navfac_atlantic/midlant/cherry_point/mcolf_atlantic_pfas.html*)

Patrick AFB (Satellite Beach, FL): For two decades, residents have reported higher rates of Hodgkin's lymphoma. Florida Department of Health (FDOH) is currently gathering health data from local citizens. Recent groundwater results show PFOA and PFOS levels ranging between 20ppt to 45ppt. Citizens have met and discussed the potential of having the base designated as a Superfund site. Citizens have also questioned if a Superfund site existed in the Satellite Beach or South Patrick Shores area; however, neither area has ever been declared a Superfund site (based on the CERCLIS database). Local dialogue suggests that the FDEP has Alternate Cleanup Levels (ACLs); however, it is not clear about the extent of FDEP's coordination with the City and DoD. (Reaching out to Superfund for updates)
(*https://www.militarytimes.com/news/your-military/2018/06/14/florida-health-agency-collectingdata-on-patrick-air-force-base-cancers/*)

MCAS Camp Lejeune: Camp Lejeune does not have PFAS in the base drinking water. There are no known exposures to PFAS-contaminated groundwater at the Base. Last year, Camp Lejeune investigated four sites that were suspected of having PFAS contamination: two fire-fighting training pits, an old plane crash site, and area down gradient of the MCAS air strip. **Groundwater was contaminated at each site except for the plane crash site.** None of the sites are near public water supply wells. Concentrations were as high as 35,000 ppt at one of the fire-fighting training pits. The Base is planning a site-wide PFAS investigation where they will be investigating 12 AOCs suspected of AFFF use and a percentage of 70 plane crash sites. They are currently conducting interviews and will submit an PA/SI Work Plan later this year. (Reaching out to Superfund for updates)

Table 1: Region 4 PFAS - Summary Table

Public Water Systems with PFOA/PFOS Sampling Events Above 70 ppt					
#	**State**	**PWS Name**	**Current Status**	**PFAS Contaminants**	**Data Source**
1	AL	Centre Water and Sewer	Ongoing monitoring. Blended source, still elevated PFC levels near or above HA. GAC installation (7/2020) (UCMR3 max combined PFOA+ PFOS: 121ppt)	PFOA, PFOS, PFBS, PFBA, PFHpA, PFHxA, PFPA	UCMR3

2	AL	Gadsden Waterworks & Sewer Board	Ongoing monitoring. Combined PFOA and PFOS levels are less than 30 ppt due to GAC treatment. GAC installation completed (12/2018) (UCMR3 max combined PFOA+ PFOS: 95ppt)	PFOA, PFOS, PFBS, PFBA, PFHpA, PFHxA, PFPA	UCMR3
3	NC	City of Greensboro	Ongoing monitoring. GAC Pilot. Recent PFOA/PFOS combined of 96 ppt so weekly sampling now. Treatment installation planned for September.	PFOS	UCMR3
4	NC	Town of Pittsboro	UNC Study 2016: PFOA (137ppt), PFOS (346 ppt), combined 483ppt; Confirmatory sampling combined PFOA&PFOS at 59ppt (June 2017); PAC treatment installed July 2017.	PFOA, PFOS	ORD- NC State Study
5	FL	City of Stuart Water Plant	Wells were taken offline. A GAC treatment pilot is underway.	PFOS	UCMR3
6	FL	Ocala - Florida State Fire College	FDEP and FDOH have been evaluating potential PFAS impacts on groundwater. PFOA and PFOS was found in the water supply well at the college. Bottled water is being provided by FDEP's Water Supply Restoration Program (WSRP). FL Rural Water Association is assisting FDEP with restoration.	PFOA, PFOS	FDEP, FDOH
7	AL	West Morgan - East Lawrence Water Authority	Installed GAC (September 2016). WMEL sued 3M, Daikin, Torey and the City of Decatur to recoup $5M costs.	PFOA, PFOS	UCMR3
8	AL	Rainbow City Utilities Board	Switched source (August 2016)	PFOA, PFOS	UCMR3
9	AL	Southside Waterworks	Switched source (June 2016)	PFOA, PFOS	UCMR3
10	AL	West Lawrence Water Co-op	Switched source (June 2016)	PFOA, PFOS	UCMR3
11	AL	Northeast Alabama Water System	Switched source from Centre (June 2016)	PFOA, PFOS	UCMR3
12	AL	VAW Water System, Inc.	Switched source (June 2016)	PFOA, PFOS	UCMR3

13	FL	Emerald Coast Utilities Authority	Two wells taken offline. One well is below advisory; however, they are still exploring treatment.	PFOA, PFOS	UCMR3
14	FL	City of Zephyrhills	Well taken offline	PFOS	UCMR3
15	GA	Rome	Blended source (July 2016)	PFOA, PFOS	UCMR3
16	GA	Chatsworth	Switched source (June 2016)	PFOA, PFOS	UCMR3
17	NC	Moore County Public Utilities - Pinehurst	Decommissioned well	PFOS	UCMR3
18	NC	Cary (Jordan Lake)	Initial sampling showed multiple PFAS at 283 ppt combined for 9 PFAS compounds. Recent SESD's sampling results show levels well below the HA for GenX, PFOS and PFOA; however, other smaller PFAS compounds have levels around 150ppt.	PFAS	Duke Researcher

GEORGIA-ALABAMA

Gadsden and Centre: Dalton Utilities land applies the waste from the County landfill and carpet recyclers to Loopers Bend, which is surrounded by the Conasauga River, a conduit of PFC contaminants into Lake Weiss directly upstream from the two Alabama public water systems, Gadsden and Centre. Both systems have filed lawsuits against multiple Georgia businesses, including carpet manufacturers, that are suspected PFC producers contributing to downstream contamination near their intakes.

Gadsden and Centre have conducted weekly to biweekly monitoring of their raw and finished water noting that their combined PFOA-PFOS levels have typically been at or near the HA. The highest PFAS levels for Gadsden and Centre were seen in the June 12, 2018 data results. Gadsden's finished PFAS levels were as follows: PFOA (71 ppt), PFOS (120 ppt) and PFBS (290 ppt). Centre's finished PFAS levels were as follows: PFOA (72 ppt), PFOS (150 ppt) and PFBS (320 ppt).

Gadsden installed GAC treatment in December 2018. Centre plans to install treatment in Summer 2020. ADEM, Centre and Gadsden are concerned that their GAC pilot will not adequately address the increasing PFAS concentrations in their raw water supply or other emerging PFAS compounds that may become subject to regulation and health advisories.

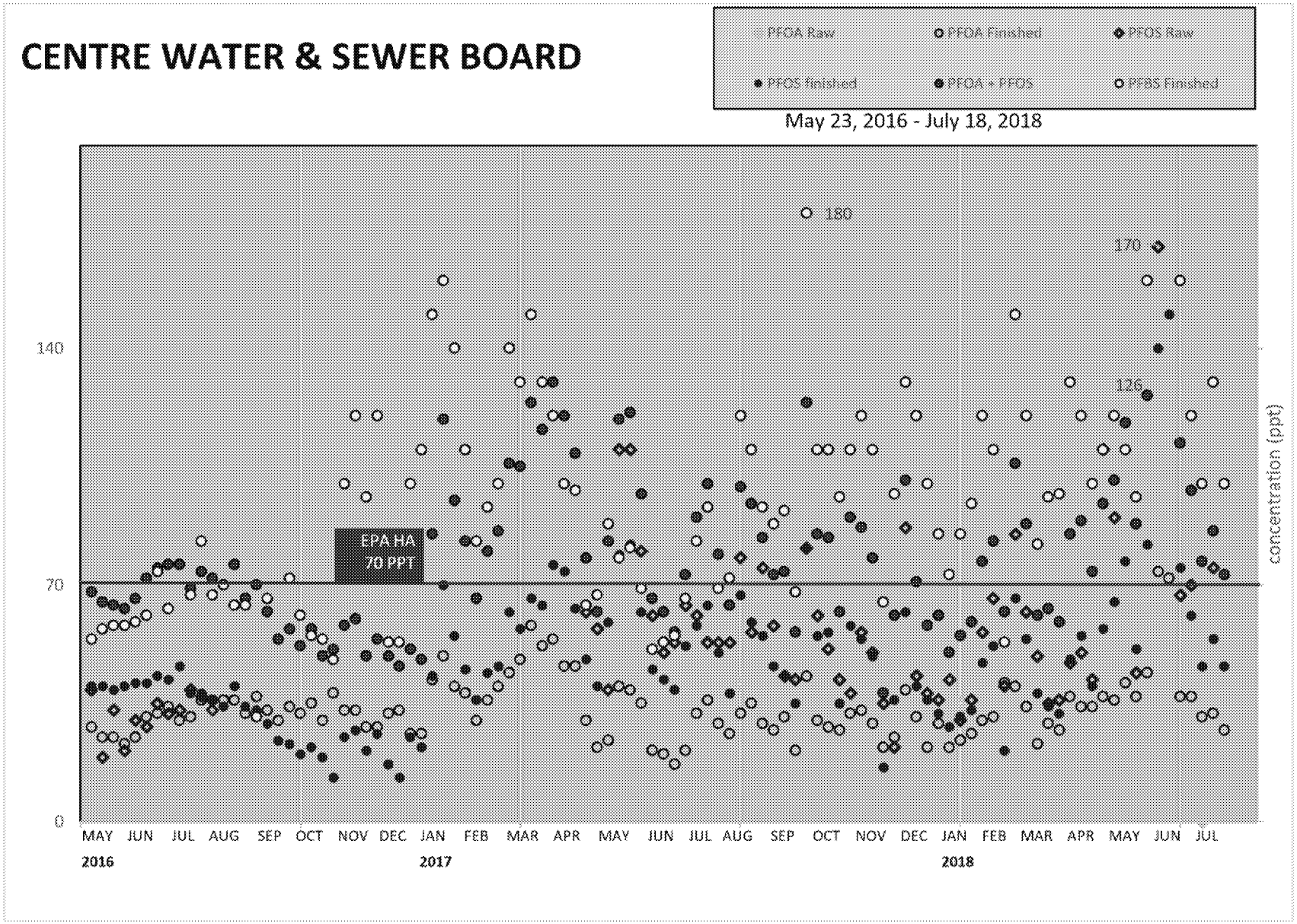
EPA involvement: Since the HA, Region 4 has remained closely engaged with ADEM and Alabama Department of Public Health (ADPH) to discuss monitoring results, assist with public notification efforts, determine alternatives in reducing PFAS levels in finished water and facilitate data sharing between ADEM and GA EPD. Additionally, ADEM has expressed concerns regarding treatment techniques for Landfill Leachate and shorter-chain compounds,

such as PFBS, which has consistently been the highest of the 7 monitored PFC compounds for Centre and Gadsden.

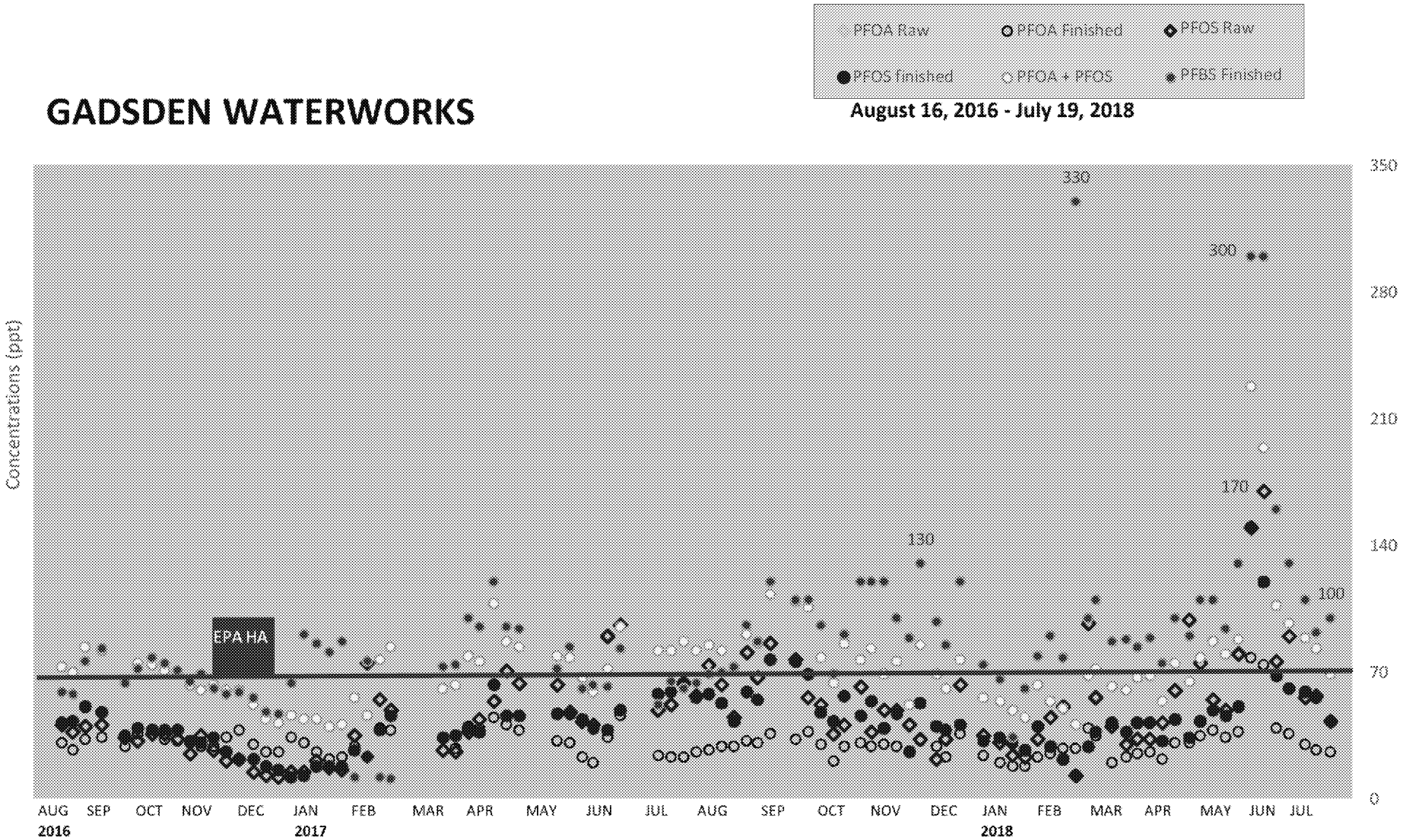
Cross-state Migration (Georgia-Alabama) SESD-Chattooga Study: ADEM suggested that there is a correlation between high rainfall in the North Georgia area which has led to increased PFAS levels in the Coosa River and ultimately in the Centre and Gadsden intakes. The Coosa and Chattooga Rivers independently flow into Lake Weiss, but limited information is known about PFAS levels on the Chattooga River because most efforts have centered around the direct linkage between Loopers Bend and the Coosa River.

EPA Involvement: In Spring 2018, SESD conducted Phase I of a study which collected samples to characterize potential PFAS contributors on the Chattooga River under high flow conditions. The resulting data demonstrated no detectable amounts of PFOA, but four samples had detectable amounts of PFOS ranging from 20-83 ng/L.

Based on the Phase I results, Region 4 received feedback from ADEM and GA EPD regarding the results and the potential to conduct a Phase II study which would prove useful in determining PFAS concentrations under the following three conditions: (1) low flow conditions on Chattooga River; (2) current low flow conditions on the Coosa River (especially due to the higher levels found at the Gadsden and Centre intakes); and (3) sedimentation and resuspension in Lake Weiss. Region 4 agreed to conduct the Phase II study and it's planned for FY19.


CENTRE WATER & SEWER BOARD
PFOA Raw
PFOA Finished
PFOS Raw
PFOS finished
PFOA + PFOS
PFBS Finished
May 23, 2016 - July 18, 2018
180
170
140
126
70
0
EPA HA
70 PPT
concentration (ppt)
MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL
2016
2017
2018

GADSDEN WATERWORKS



ALABAMA

West Morgan – East Lawrence (WMEL): Daikin, Toray and 3M plants are three PFC manufacturing facilities that are clustered around the Baker Creek and Tennessee River area in Decatur, AL. 3M, the largest of the three facilities, land applied industrial sludge to onsite fields. This area is involved in an ongoing RCRA corrective action investigation for other contaminants. Elevated levels of PFAS compounds were found at the WMEL Authority, located 13-miles downstream from the 3M facility.

In 2009, EPA R4 requested ATSDR conduct PFC serum sampling of citizens in the vicinity of biosolids application fields in Decatur, Alabama. ATSDR concluded that elevated blood PFC concentrations resulting from oral exposure to drinking water. In 2016, ATSDR followed up with the original cohort to compare PFC serum results. This new study indicated PFC serum levels declined between the 2010-2016 timeframe.

After the WMEL lawsuit, Daikin agreed to pay $5M to WMEL, which has been utilized to pay for their Granular Activated Carbon (GAC) filtration system. Their treatment upgrades have indicated PFAS levels are remaining below the HA.

FLORIDA

Stuart: The City operated an above-ground Fire Training Platform. Northrop Grumman owns some of the impacted wells near the airport. Grumman has been under two EPA RCRA 3008(h) orders regarding low level volatile organic compounds in groundwater since 1990.

On May 27, 2016, days after the Final Health Advisory, the City voluntarily shut off three wells; however, two of the City's other wells currently have exceedances: DW at 30,100 ppt; BW at 320 ppt (on March 9, 2018). Two private wells have been connected to a municipal supply. FDEP has a sample workplan to sample soils, monitor wells and survey other potentially impacted private wells. Additionally, FDEP is currently trying to gain access from Northrop Grumman to sample their wells. Stuart has applied for a permit to upgrade their Drinking Water Plant to remove PFCS from raw water.

Ocala: In September 2018, PFOS and PFOA were detected in samples collected by FDEP from the public water supply well at the Florida State Fire College as part of ongoing assessment efforts between DEP and DOH to evaluate the extent of potential PFAS impacts on groundwater. FDEP immediately notified the Florida Department of Health in Marion County (DOH-Marion) of the results. FDOH notified all Fire College staff and trainees of the test results, and a short-term alternative water source was provided by FDEP's Water Supply Restoration Program (WSRP).

FDEP recently approved a permit modification to install filtration on the existing well. FDOH identified 90 potable wells within a one-mile radius of the College. To date, FDOH has obtained owner permission to sample all but three of these wells, and sampling is complete for approximately 75% of the wells. As results become available, FDOH immediately contacts the owners of wells where PFOS and PFOA are detected at concentrations above FDOH's Health Advisory Level (HAL) of 70 parts per trillion, to provide them with the results and recommend

that they contact FDEP's WSRP for assistance, to ensure that they have access to safe drinking water.